

DEPARTMENT OF PESTICIDE REGULATION  
PEST MANAGEMENT GRANTS PROGRAM  
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**Title:** Augmentative Biological Control Using Transplants

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Progress Report

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**Summary**

Year one of a two year study on a novel parasite release strategy is near completion. We succeeded in getting inoculated plants into the two farms, one organic and the other conventional, despite the prolonged, wet, cool spring. Problems associated with the weather and host feeding hampered the study, but we have seen some degree of impact at the organic farm due to parasites released through transplants and by hand. Almost no population of silverleaf whitefly developed at the conventional grower who used a trench application of imidacloprid at seeding. The lack of a host population at this farm best explains why the released parasites did not establish.

**Results and Discussion**

We are near completing year one of a two year study on whitefly control in melons. We made releases of parasites at two commercial farms of cantaloupe in the Imperial Valley. The first is an organic grower, where we are comparing the effect of transplants (with parasites) against a hand-release of parasites, and a no-release control. The second site is a conventional grower who uses imidacloprid (Admire<sup>®</sup>), where we are comparing whitefly control by adding parasite inoculated transplants to one portion of conventionally grown cantaloupe. We've had mixed success in our work this spring at both sites due to unusually cool, wet weather, and a bad batch of plants (we used about 6 batches), and unanticipated, excessive host feeding by our parasite. However, we succeeded in getting parasites onto plants and into the two fields. And we are beginning to

see some separation in treatment effects at the organic farm, with the lowest number of whiteflies in the transplant plots (Fig. 1). We set up a split comparison at the conventional site, with two, one acre plots of treated transplants, and two, one acre controls in a 70 acre field; a great field for its size and grower cooperation. However, we have detected hardly any whiteflies at this site this spring, and no parasitism on plants other than the transplants has been detected to date.

About 500 plants per acre were added to the organic farm and conventional farm in March. We placed about 1 plant for every ten they had seeded. Our transplants continued to grow and eventually caught up with the seeded plants, but some of the first batch of transplants planted at the organic farm (March 6th) died, or lost their first true leaves, and were replanted, March 16th. We replaced 50% of those originally planted. We purchased our transplants from a local vendor who supplies plants, including melons, for the Imperial Valley. The first batch of plants they produced were slightly stressed and when placed into the field lost many of their first true leaves. These are the leaves where the parasitized whiteflies reside. All the remaining batches of plants were excellent in vigor, and we suspect that the first batch was produced under the coolest, shortest days of winter. We plan on placing parasitized whitefly on both the first and second set of true leaves next season. We placed transplants into the conventional farm March 13th. The quality of plants was far better and resembled the seeded plants in growth within six weeks.

We ended up releasing far fewer parasites, by transplant, than we had planned; about 6400 to 7800 parasites per acre at the organic farm and approximately 24,000 per acre at the conventional field. This is much lower than the target of 40,000, the number found to give good control of whiteflies when releases of parasites are done by hand. We discovered that many of the whitefly nymphs were fed on by adult *Eretmocerus* after inoculating the first batch of transplants with parasites. Using excessive numbers of parasites may give higher parasitism levels, but it reduced the number of viable, parasitized hosts per plant. This is an easy problem to overcome. I have already done trials testing the

number of parasites required to achieve high parasitism levels, and we will conduct additional tests to insure optimal parasite numbers for next season's trial.

The difference in amount of control provided by the released parasites at the organic farm may have been higher if we had greater separation of plots. We ended up with a smaller piece of land than desired, each experimental plot about, 1/3 acre. However, we decided that additional replication was more important than plot size, and that early season results would give us the needed information to address our hypothesis: hand release vs. transplants. The prolonged, cool, wet spring, however dragged out the length of the experiment, allowing far more time for dispersal of parasites than we had anticipated. More parasites were released by hand than ended up in the field on transplants, 9,000 vs. 7,000 per acre. This is evidenced by the much higher number of parasites showing up in the hand release plots on April 21 (Fig. 1). We feel a fair comparison of these release methods requires that equal number be released in each treatment, however this year we were unable to control for survivorship of immature parasites (those inside the whitefly hosts) once they got into the field. We lost parasites on transplants due to the loss of first true leaves and unusually high host feeding.

Despite the numerous, unforeseen problems this spring, we feel pretty good about results to date. Even though very low numbers of parasites actually got into the organic field, we have been able to see impact due to treatments, and it appears that the transplants are providing about the same amount of control as the hand releases, or even better. We have no results to date from the conventional field. Next year we will choose farms that are in the most extreme whitefly prone areas of the Imperial Valley to demonstrate the use of transplants for whitefly control.

**Fig. 1. Insect Densities, By Treatment. Organic Farm, Imperial Valley, 1998. Means  $\pm$  1SE.**

